

REMARKS

Claims 1-24 are all of the claims presently pending in this application.

The foregoing claim amendments are responsive to the issues raised in the rejection under 35 U.S.C. §112, second paragraph. No issues of new matter are believed to arise.

The obviousness rejection of claims 1-7, 9-11, 13, 14 and 20-24 in view of Heinen is respectfully traversed. The Examiner apparently relies on Fig. 5 of Heinen. However, Heinen appears to disclose smaller grooves that extend transverse (perpendicular) to the longitudinal direction of the larger grooves. By way of contrast, claim 1 clearly recites that “a plurality of smaller grooves formed in the walls of at least one of said groove formed in said tread...extend in a longitudinal direction of said at least one groove.” Claim 1 is, therefore, believed to be patentable over Heinen, and claims 2-24 are believed to be allowable at least by virtue of their dependency.

Regarding the rejection of claims 1-10, 13, 14 and 20-24 over EP ‘885, the Examiner points out that he is reading the “at least one groove” (i.e., the larger groove) in claim 1 as including a sipe, although that is clearly not the intent of the present invention. Claim 1 is hereby amended to recite “...grooves formed in said tread for defining a plurality of blocks...” See, e.g., specification, page 28, second full paragraph. This should be sufficient

to distinguish over EP '885, as the sipes in that reference clearly do not define a plurality of blocks.

Claims 1-10, 13, 14, 18 and 20-24 are rejected under 35 U.S.C. §103(a) as being unpatentable over Japan 3-57704 (JP '704) in view of at least one of EP '885, Japan 7-186633 (JP '633) and Great Britain 565477 (GB '477).

JP '704 discloses a plurality (two or more) of dented lines formed in groove walls of conventional grooves. Each dented line has a depth in a range of 0.5 to 2 mm and a width in a range of 0.5 to 2 mm. However, JP '704 neither teaches nor suggests pitches of the dented lines.

As explained in the background section of the present application, JP '704 as proposal (c) encountered the problem of a raised resistance and was unsatisfactory in effect and, consequently, formed the basis for the present invention's solution.

In the present invention, as recited in claim 1, a plurality of smaller grooves are formed in the walls of the grooves, such that the smaller grooves have a depth set within a range of 0.01 to 0.5 mm and a pitch set within a range of 0.01 to 0.5 mm. Due to this specific construction, the resistance between flowing water and groove walls, which is quite high in the conventional structure such as JP '704, is significantly reduced, whereby the wet

performance of the tire is significantly improved. Thus, the present invention is not only novel (as regards the pitch), but also has sufficient inventiveness over JP '704.

JP '633 discloses a structure in which small grooves are formed at the ground-contact surface of a block. This reference is completely irrelevant to the present invention.

GB '477 discloses a structure in which dents/projections are formed in groove walls. However, GB '477 completely fails to teach or suggest the depth and pitches of the dents/projections thereof, and thus is clearly different from the present invention.

It is noted that an object of the present invention is to reduce resistance between flowing water and the groove walls, but this is foreign to the object of GB '477. GB '477 has no relation to the meticulous definitions of depths and pitches of dents/projections as defined in claim 1 of the present application. Accordingly, claim 1 is believed to be not only novel (as to the depth and pitches), but also to have sufficient inventiveness over GB '477.

In view of the preceding amendments and remarks, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue that the Examiner feels may be best resolved through a personal or telephonic interview, he is kindly requested to contact the undersigned attorney at the local telephone number listed below.

AMENDMENT UNDER 37 C.F.R. §1.111
U.S. SERIAL NO. 09/777,653

ART UNIT 1733
Q62556

A Petition for Extension of Time with appropriate fee accompanies this document.
The USPTO is directed and authorized to charge all additional required fees (except the Issue Fee and/or the Publication Fee) to Deposit Account No. 19-4880. Please also credit any overpayment to said Deposit Account.

Respectfully submitted,



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PATENT TRADEMARK OFFICE

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ART UNIT 1733
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APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend the claims as follows:

1. (Amended) A tire comprising:

a tread;

[at least one groove] grooves formed in said tread for defining a plurality of blocks;

and

a plurality of smaller grooves formed in the walls of, at least one of said [groove]
grooves formed in said tread, so as to extend in [the] a longitudinal [directions] direction of
said at least one groove,

wherein said smaller grooves have a depth set within a range of 0.01 to 0.5 mm and a
pitch set within a range of 0.01 to 0.5 mm.

3. (Amended) A tire according to Claim 2,

wherein the sectional shape, as taken at a right angle with respect to the longitudinal
[directions] direction, of said smaller grooves is made symmetric with respect to the width-
wise center lines of said smaller grooves.

5. (Amended) A tire according to Claim 1,
wherein a relation of $P \leq 2D$ is satisfied [if] and the depth of said smaller grooves is designated by D and [if] the pitch [P] of said smaller grooves is designated by P.

6. (Amended) A tire according to Claim 1,
wherein said smaller grooves are formed in the groove walls continuing in the circumferential [directions] direction.

7. (Amended) A tire according to Claim 1,
wherein said smaller grooves are juxtaposed in parallel and [have] define undulating groove wall surfaces.

9. (Amended) A tire according to Claim 1,
wherein the walls in the vicinity of the [confluence] intersection of said groove and another said groove are provided with turbulence generating zones for generating minute turbulences in a fluid flowing in the vicinity of the groove walls thereby to suppress separation of the fluid flowing in said groove.

15. (Amended) A tire according to Claim 1,

wherein [when the] groove wall faces of a larger size and [the] groove wall faces of a smaller size in the [groove] longitudinal [directions] direction are compared, and said smaller grooves have [the] a larger depth and/or [the] a larger pitch in the groove [walls] wall faces of the shorter size than in the groove [walls] wall faces of the longer size.

16. (Amended) A tire according to Claim 1, comprising: a first land portion; a second land portion defined by a plurality of grooves and adjoining said first land portion across a first groove; and a third land portion defined by a plurality grooves and adjoining said first land across said first groove, said third land portion having a wall face which faces the first groove and has a smaller size in the [groove] longitudinal [directions] direction than a wall face of the second land portion which faces the first groove,

wherein in the wall face of said first land portion which faces the first groove, the depth and/or the pitch of said smaller grooves is larger in the portions confronting said third land portion than in the portions confronting said second land portion.

17. (Amended) A tire according to Claim 1,

wherein the tread is provided with: a plurality of grooves extending along the tire circumferential [directions] direction; and a plurality of grooves extending along the tire widthwise [directions] direction, and

wherein the walls of the grooves extending along the tire circumferential [directions] direction are free of said smaller grooves in a portion thereof intersecting prolongations of the grooves extending along the tire widthwise [directions] direction, as connected with the grooves extending along said tire circumferential [directions] direction.

19. (Amended) A tire according to Claim 1,

wherein the at least one groove extends along the tire circumferential direction, and said smaller grooves [formed in the walls of the groove extending along the tire circumferential directions] are provided in plurality at a spacing in the tire circumferential [directions] direction and are so inclined with respect to said tread surface that the distance from said tread surface is increased the more in the tire rotating direction in the vicinity of the grounding surface of the tire, and are made parallel to the road surface at least at their end portions on the tire advancing side in the region of the grounding surface on the tire advancing side and within a range of no more than 5 mm from the road surface.

20. (Amended) A tire according to Claim 1,

wherein when a rib-shaped portion formed between said smaller grooves is viewed in a section normal to the longitudinal [directions of said smaller grooves] direction, relations of $L2 \geq 0.6 L1$ are set: [if] and the intersection between a prolongation of the wall face of one smaller groove on the bottom side thereof and a prolongation of the wall face of the other smaller groove on the bottom side thereof is designated by point A; [if] and the intersection between the wall face of said rib-shaped portion of the one smaller groove on the crest side thereof and the wall face of the rib-shaped portion of the other smaller groove on the crest side thereof is designated by point B; [if] and the distance from a virtual line joining the bottom of the one smaller groove and the bottom of the other smaller groove to said point A is designated by L1; and [if] the distance from said virtual line to said point B is designated by L2.

21. (Amended) A tire according to Claim 1,

wherein [if] the wall of said smaller groove on the tread surface side is designated by a first groove wall and [if] the angle of inclination of said first groove wall with respect to a line normal to the wall of the groove where said smaller groove is formed is designated by $\theta 1$, said inclination angle $\theta 1$ is set larger on said first groove wall of the smaller groove

formed on the bottom side of said groove than on said first wall of the smaller groove formed on the tread surface side.

22. (Amended) A tire according to Claim 21,

wherein [if] the wall of said smaller groove on the bottom side of said groove is designated by a second groove wall and [if] an angle, as contained between said first groove wall and said second wall is designated by θ_2 , said angle θ_2 is set larger of said smaller groove formed in the bottom side of said groove than of the smaller groove formed in the tread surface side.

23. (Amended) A tire according to Claim 1,

wherein the bottom of said smaller groove is shaped to have a generally arcuate shape, when viewed in a section normal to the longitudinal [directions] direction of said smaller groove, and the rib-shaped portion between the smaller grooves is shaped to have an acute angle less than 90 degrees at its crest.